CLAIMS

1. Seismic wave simulation apparatus for generating a simulated seismic wave in a geological specimen, which comprises an elastic energy accumulator ~~(4)~~ comprising a member arranged, in use, to act on the geological test specimen and supported to resist movement in a direction away from the specimen when the elastic energy accumulator is preloaded in said direction by actuator means ~~(5)~~, the arrangement being such that, in use, the preload force can be quelled suddenly, for example by triggering an explosive bolt ~~(6)~~, so that the member is released into impact or energy transfer with the geological specimen thereby transmitting a seismic wave to the geological specimen, characterised in that the elastic energy accumulator member ~~(4)~~ has a number of sections of different diameters ~~(4a-g)~~.

2. Apparatus as claimed in Claim 1 in which the elastic energy accumulator member ~~(4)~~ has a number of co-axial cylindrical sections of different diameters ~~(4a-g)~~ of which the section ~~(4g)~~ at the end of the member remote from the actuator means ~~(5)~~ constitutes an impactor which, in use, is held adjacent the geological specimen under test so as to impact the specimen on release of the member.

3. Apparatus as claimed in Claim 2 having a section ~~(4a)~~ nearest the actuator means which is the smallest diameter of the sections.

4. Apparatus as claimed in Claim 3 including an explosive bolt ~~(6)~~ disposed diametrically of said smallest diameter section ~~(4a)~~.

5. Apparatus as claimed in Claim 3 ~~or Claim 4~~ in which said smallest diameter section ~~(4a)~~ adjoins a large diameter section ~~(4b)~~ which is connected to two further sections ~~(4c,4d)~~ stepped down in diameter and connected in turn to a smaller diameter section ~~(4e)~~ which is larger

than said smallest diameter section (~~4a~~) adjacent the actuator means (~~5~~).

6. Apparatus as claimed in Claim 5 in which said smaller diameter section (~~4e~~) is connected to two larger sections (~~4f, 4g~~) which are stepped up in diameter, the last of these sections (~~4g~~) constituting the impactor to be located adjacent to the geological specimen in use.

7. Apparatus as claimed in Claim 6 in which the accumulator member (~~4~~) is supported to resist movement in a direction away from the geological specimen under test, by said last-mentioned section (~~4g~~).

8. Apparatus as claimed in Claim 7 in which a blocking system or fixed support is provided at the rear of said last-mentioned section (~~4g~~) surrounding the penultimate section (~~4f~~), thereby resisting or preventing movement of the accumulator member (~~4~~) in said direction on the application of the preload force.

9. Apparatus as claimed in Claim 1 in which the elastic energy accumulator (~~4~~) includes seven cylindrical sections of different diameters (~~4a-g~~).

10. Apparatus as claimed Claim 1 ~~in any one of the preceding claims~~ in which the combined length of the elastic energy accumulator (~~4~~) and the actuator means (~~5~~) is of the order of 500 metres.

11. Apparatus as claimed in Claim 1 ~~any one of the preceding claims~~ having transducers (~~8~~) arranged to measure, in use, the mechanical behaviour across the section of the geological specimen through which a seismic wave is being transmitted.

12. Apparatus as claimed in Claim 11 in which the transducers (~~8~~) are in the form of bars or elongate members

arranged in a direction parallel to the direction of propagation of the seismic wave.

13. Apparatus as claimed in ~~any one of the preceding claims~~ Claim 1 in which seismic sensors ~~(11)~~ are included extending at an angle or transversely of the direction of propagation of the wave.

14. Apparatus as claimed in ~~any one of the preceding claims~~ Claim 1 including a thin metallic or conductive sheet ~~(9)~~ to be fixed to the surface of the geological specimen (for example by cement) and connected to measuring instrumentation such as a Wheatstone bridge, for example, in order to obtain superficial strain measurement.

15. Apparatus as claimed in ~~any one of the preceding claims~~ Claim 1 in which the measuring instrumentation includes accelerometers ~~(10)~~.

16. A method of inducing or generating a simulated seismic wave in a test specimen, for example a geological specimen, said method including the steps of providing an elastic energy accumulator ~~(4)~~ comprising a member which is arranged to act on the specimen so as to deliver a seismic wave to the specimen, supporting the elastic energy accumulator to resist movement in a direction away from the specimen and preloading the elastic energy accumulator in said direction, suddenly quelling the preload force, for example by triggering an explosive bolt ~~(6)~~ in the elastic energy accumulator, thereby releasing the elastic energy accumulator into impact or energy transfer with said specimen thereby transmitting a simulated seismic wave to the specimen, collecting data from the specimen and analysing said data, ~~characterised~~ characterized in that the energy accumulator member is ~~so shaped~~ 30 sheets by providing it with a number of sections of different diameters that it delivers a seismic wave of known amplitude and duration.

AMENDED SHEET